

A database dedicated to development of machine learning based disruption predictors

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Machine learning based disruption prediction method have exhibited good prediction performance with higher success rate, low false alarm rate and earlier warning time than physics based methods. One important thing pushed recent advances in machine learning field is high-quality training data. So a database with rich set of accurate disruption related labels is crucial to the development of a high performance disruption predictor. On J-TEXT in order to fast and iteratively develop machine learning based disruption predictors, a database dedicated for machine learning disruption prediction is built. This database provided not only disruption related labels, interfaces for querying the data based on user proved filter and auto generation of train and test data but also interface for benchmark the predictors. Its modular design allow us to plug-in various shot analyze modules which scan the diagnostic database and generate different labels automatically. These modules can be scheduled and run parallel on a cluster which speed up the shot analysis process. The generated labels are inserted into a MongoDB NoSQL database for later querying. But one major hurdle for machine learning disruption prediction is they perform un-acceptably poor on devices other than they are trained on. It requires data from many different tokamaks to possibly develop a cross machine predictor. So this database also has a data import module which reads diagnostic data from different data source such as MDSplus and store them as HDF5 files with unified data structure on a parallel file system. Now it has J-TEXT data, but it is easy to import data from different machines and provide unified data access interface.

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